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MEMORANDUM

CASE: Lisa M. Roberts v. Nancy Howton
CV-8-1433-HU

TO: Alison Clark
Assistant Federal Public Defender

From: Karen Lawless, Forensic DNA Consultant
** Confidential Work Product**

RE: Review of DNA Materials – Review of Examination and DNA Analysis by OSP Lab, Evidence that should be remaining for retesting, interpretation and comments regarding OSP results, new processes available

Date: June 24, 2010

1. INTRODUCTION / MATERIALS REVIEWED

I was asked by Assistant Federal Public Defender Alison Clark to review forensic material in Lisa M. Roberts v. Nancy Howton. The material consisted of laboratory reports and bench notes written by several individuals at the Oregon State Police Forensic Laboratory (OSPFL) under Laboratory Case No. 02L-004563.

The following reports and corresponding bench notes were reviewed:

- OSP Lab Report by Rhonda Banks dated 06/10/02 regarding a vehicle process
- OSP Lab Report by Rhonda Banks dated 06/26/02 regarding forensic biology screening and trace examination
- OSP Lab Report by Mary Krings dated 08/07/02 regarding DNA analysis
- OSP Lab Report by Elaine Kitano dated 07/09/03 regarding DNA analysis
- OSP Lab Report by Rhonda Banks dated 07/14/03 regarding forensic biology screening
- OSP Lab Report by Elaine Kitano dated 09/22/03 regarding DNA analysis
- OSP Lab Report by Elaine Kitano dated 11/24/04 regarding DNA analysis.

The above reports and bench notes included, but were not limited to, the Forensic Biology and DNA analysis of two vaginal smears (Lab Ex. 6.1), six vaginal swabs (Lab Ex. 6.4), six breast swabs (Lab Ex. 6.8), fingernail scrapings from the right hand (Lab Ex. 6.9), and fingernail scrapings from the left hand (Lab Ex. 6.10) reportedly collected at the autopsy of Jerri Williams, and a pillowcase (Lab Ex. 7) reportedly collected from the scene near the body.

2. DNA METHODOLOGY IN 2002 VERSUS 2010

In 2002, STR (Short Tandem Repeat) analysis was performed by extracting, quantifying, amplifying and typing the DNA by capillary electrophoresis.

The AmpFlSTR Profiler Plus PCR[1] Amplification kit was used to amplify nine (9) loci[2] and Amelogenin, the sex-determination marker. The following samples were amplified using only the Profiler Plus kit:

Lab Ex. 6.4	Vaginal swabs
Lab Ex. 6.8	Breast swabs
Lab Ex. 6.10	Fingernails from left hand
Lab Ex. 7.2	Cutting from pillowcase
Lab Ex. 7.3	Cutting from pillowcase

The AmpFlSTR COfiler PCR Amplification kit was used to amplify six (6) loci and Amelogenin; however, since two (2) of the loci from the Profiler Plus are duplicated, the total complement is thirteen (13) loci. The following samples were amplified using both Profiler Plus and COfiler kits:

Lab Ex. 6.9	Fingernails from right hand
Lab Ex. 7.4	Cutting from pillowcase

Now in 2010, many changes have occurred since the original STR analysis. First, the procedures used to extract the DNA have become more efficient and yield a purer DNA sample. Second, a better quantification system has been introduced that more accurately estimates the quantity of both the total human DNA and total human male DNA in a sample. Thirdly, amplification only needs half the sample amount previously required and the results are much more discriminating with a newer kit, the AmpFlSTR Identifiler PCR Amplification Kit which simultaneously amplifies 15 STR (short tandem repeat) loci plus Amelogenin, the sex-determination locus. DNA typing still occurs by capillary electrophoresis but with newer and updated instrumentation.

Finally, additional DNA testing processes including Y-STR Analysis and Mini-STR Analysis are valuable tools that stand alone or can be used alongside tradition STR testing. Y-STR analysis involves the examination of the DNA on the Y chromosome. Since the Y chromosome is found only in males, Y-STR analysis is highly suited for samples that are mixtures or where the female portion may be at high levels. Y-STR Analysis ignores the female DNA so that it does not interfere with the typing results of the male component.

Mini-STR Analysis using the AmpFlSTR® MiniFiler™ PCR Amplification Kit is a tool that, while not as discriminating as the Identifiler, can yield results with challenging samples that are degraded and/or inhibited. MiniFiler uses the eight largest and most difficult loci from the Identifiler kit that are most likely to dropout or give incomplete results. In addition, the loci are compatible with CODIS[3].

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[1] Polymerase Chain Reaction (PCR), also known as molecular "Xeroxing," is an enzymatic process where a specific area of the DNA molecule is duplicated many times to produce many copies of specific DNA sequences
[2] Loci – plural of locus; locus – a specific location on a chromosome
[3] CODIS – Combined DNA Index System

3. SAMPLES AVAILABLE FOR FURTHER TESTING

3.1 Six Vaginal Swabs (Lab Ex. 6.4):

Six vaginal swabs were originally collected at the autopsy of Jerri Williams. No presumptive biology screening tests were performed on the swabs and they were forwarded directly for DNA analysis. The six vaginal swabs were reportedly consumed during the DNA analysis.

In the OSP Lab Report dated August 7, 2002, DNA Analyst Mary Krings concluded:
"DNA from more than one person was detected on both the sperm fraction of the vaginal swabs (Exhibit 6.4), and the breast swab (Exhibit 6.8). The major profile is consistent with coming from Jerri Williams. Ed Mills, Daniel Miller, Curtis Fields, Lisa Roberts, and George Deigner, as well as Sydney Houston (PPB Case No. 02-48228; OSP Lab No. 02L-4508) are all excluded as contributors to the minor profile(s). The minor profile(s) has been compared to the profiles stored in the Oregon State Police databases. No matches were found at this time; however the minor profile(s) is below the threshold for entry into the database or for making a more conclusive determination."

Interpretation/Comments on the vaginal swabs and smears regarding OSP results and conclusions:

a. The conclusion by OSP stated that "DNA from more than one person was detected on the sperm fraction of the vaginal swabs." Based on the data, there are at least two contributors to this sample and potentially more if the trace alleles[4] are considered. Trace alleles can be interpreted with caution and may be used for exclusionary purposes.
b. Further, the conclusion by OSP states "the major profile is consistent with Jerri Williams." This is reasonable since the swabs were collected from Jerri Williams and it would not be uncommon during a differential extraction to detect the "owner's " DNA type in the sperm fraction, especially if there is a significant difference in quantity of DNA between the sperm donor and the "owner."
c. The minor partial profile(s) has been contributed by at least one male individual. This is supported by the identification of sperm on the vaginal swabs and the detection of the Y allele at the Amelogenin locus. Additional testing may be able to detect a complete profile.
d. Two loci indicated the presence of three trace alleles. Since each individual generally only contributes, at most, two alleles at each locus, the presence of three trace alleles indicates another potential contributor; however this cannot be confirmed as there is not enough data. Additional testing may or may not be able to confirm the presence of a third contributor.
e. Due to the partial results obtained for the male contributor of the sperm fraction of the vaginal swabs in 2002, DNA Analyst Mary Krings was only perform a keyboard search and compare to the small number of profiles contained within the state database at that time. There was not enough data to enter the sample into or search the national database. Since 2002, many profiles have been added to the database. With improvements to the DNA processes, re-testing the evidence available from the vaginal swabs may be able to provide a complete STR profile for the male component of the sperm fraction that is able to be uploaded and searched against the national CODIS database.[5] Additionally, Y STRs and/or Mini STRs could be used.

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[4] Trace Alleles are alleles that are detected but that fall below the stochastic threshold. Alleles falling below the stochastic threshold may have allelic dropout of a sister allele.
[5] The CODIS database consists of several indexes: convicted offenders, forensic samples, arrestees (in some states), missing persons, unidentified remains, and relatives of missing persons. The database is overseen by the FBI and

f. The evidence from the Vaginal Swabs (Lab Ex. 6.4) that should be remaining and available for re-testing is as follows:
   i. Any remaining DNA extracts (the bench notes indicate that extract was retained; however the notes do not indicate how much is left).
   ii. Remaining underlying swab material and the swab sticks.
   iii. Sperm slides created during the DNA extraction process. There appear to be three (3) slides with combined total of approximately twenty-five sperm heads. While slides[6] are not the most ideal sample, it is possible to attempt to collect the sperm heads off the slides and obtain a complete DNA profile.
   iv. Vaginal smears (Lab Ex. 6.1) made at the time of collection of the vaginal swabs. There appear to be two (2) smears with a combined total of approximately 12 sperm heads. While smears[7] are not the most ideal sample, it is possible to attempt to collect the sperm heads off the slides and obtain a complete DNA profile.

3.2 Six Breast Swabs (Lab Ex. 6.8):

Six breast swabs were originally collected at the autopsy of Jerri Williams. No presumptive biology screening tests were performed on the swabs and they were forwarded directly for DNA analysis. Four of the Breast swabs were reportedly consumed during the DNA analysis. There should be two swabs available for testing.

In the OSP Lab Report dated August 7, 2002, DNA Analyst Mary Krings concluded:
"DNA from more than one person was detected on both the sperm fraction of the vaginal swabs (Exhibit 6.4), and the breast swab (Exhibit 6.8). The major profile is consistent with coming from Jerri Williams. Ed Mills, Daniel Miller, Curtis Fields, Lisa Roberts, and George Deigner, as well as Sydney Houston (PPB Case No. 02-48228; OSP Lab No. 02L-4508) are all excluded as contributors to the minor profile(s). The minor profile(s) has been compared to the profiles stored in the Oregon State Police databases. No matches were found at this time; however the minor profile(s) is below the threshold for entry into the database or for making a more conclusive determination."

A second OSP Lab Report dated July 9, 2003, was issued regarding the breast swabs. DNA Analyst Elaine Kitano concluded:
A microscopic examination was performed on this exhibit. No spermatozoa heads were observed. No further DNA analysis was performed.

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only authorized laboratories are able to enter and compare DNA profiles. There are three levels within CODIS: Local, State, and National. The FBI is the agency that issues the guidelines for the evidence samples that are entered into CODIS. Per the FBI website, as of April 2010, there were 8,201,707 offenders and 315,789 forensic profiles in the national database. 112,058 of the offender samples and 6,306 of the forensic profiles were attributed to Oregon.

[6] Slides require the laboratory to have the ability to process non-routine types of samples. The Oregon State Police Laboratory has not always been able or willing to process slides.

[7] Smears require the laboratory to have the ability to process non-routine types of samples. The Oregon State Police Laboratory has not always been able to willing to process smears.

Interpretation/Comments on the breast swabs regarding OSP results and conclusions:

a. The conclusion by OSP stated that "DNA from more than one person was detected" on "the breast swabs." Based on the data, considering trace alleles, and locus imbalance, there are at least two and potentially a third contributor to the breast swabs. The major contributor is consistent with Jerri Williams. The minor profile(s) are mostly trace results. However, since a Y allele was detected at the Amelogenin locus, at least one of the minor contributors to the breast swabs is male. This fact was not stated in OSP's report.
b. Two different extractions were done on the breast swabs and each gave slightly different results which further supports the possible presence of at least two contributors to the breast swabs (in addition to Jerri Williams' contribution).
c. There are some allele consistencies between the partial minor profile(s) of the vaginal swabs and the partial minor profile (s) of the breast swab indicating that these profiles may have been contributed by the same individual. Due to the low level of DNA detected, this consistency could only be confirmed with additional testing.
d. In 2003, OSP Lab made a slide from one of the breast swabs. The bench notes indicate the presence of a "few RBCs." "RBC" is an abbreviation for red blood cells. This fact was not stated in OSP's report. No further presumptive or confirmatory testing was done to assess the possible presence of blood.
e. Due to improvements in processes since 2002, re-testing the evidence available from the breast swabs may be able to provide a complete STR profile for the minor male component that is able to be uploaded and searched against the National CODIS database. Additionally, Y-STR Analysis and/or Mini-STR Analysis could be used.
f. The evidence from the Breast Swabs (Lab Ex. 6.8) that should be remaining and available for re-testing is as follows:
    i. Any remaining DNA extracts (the bench notes indicate that extract was retained; however the notes do not indicate how much is left).
    ii. Two breast swabs.
    iii. Supernatant[8] from microscopic examination by Ms. Kitano.

3.3 Fingernails from the Right Hand (Lab Ex. 6.9):

Fingernail clippings were taken at autopsy. No presumptive biology screening tests were performed on the clippings and they were forwarded directly for DNA analysis. The nail ends were reportedly swabbed and the swab used for DNA analysis. The clippings were repackaged and therefore should be available for retesting.

In the OSP Lab Report dated August 7, 2002, DNA Analyst Mary Krings concluded:
"DNA from more than one person was detected on the right hand fingernails (Ex. 6.9). The female DNA foreign to Jerri Williams is consistent with coming from Lisa Roberts....DNA from a third individual is also present at levels too low to make a conclusive determination."

[8] Supernatant - The soluble liquid portion of a sample after centrifugation of insoluble solids.

Interpretation/Comments on the right hand fingernails regarding OSP results and conclusion:

a. Based on the data, one of the alleles detected was the Y allele at the Amelogenin locus. This Y allele could only have been contributed by a male individual. This fact was not stated in OSP's report.
b. Further, while not conclusive, the trace alleles foreign to both Jerri Williams and Lisa Roberts, which were detected on the right hand fingernail clippings are consistent with trace alleles detected on the vaginal swabs. Re-testing could assist in confirming or refuting whether they were donated by the same individual. STR-Analysis, Y-STR Analysis, and/or Mini-STR Analysis could be used.
c. The evidence from the Right Hand Fingernails (Lab Ex. 6.9) that should be remaining and available for re-testing is as follows:
    i. Any remaining DNA extracts (the bench notes indicate that extract was retained; however the notes do not indicate how much is left).
    ii. The actual fingernail clippings. Even though the fingernail clippings have been swabbed previously, they may still offer enough evidence to obtain a DNA profile for the minor male component.

3.4 Fingernails from the Left Hand (Lab Ex. 6.10):

Fingernail clippings were taken at autopsy. No presumptive biology screening tests were performed on the clippings and they were forwarded directly for DNA analysis. The nail ends were reportedly swabbed and the swab used for DNA analysis. The clippings were repackaged and therefore should be available for retesting.

In the OSP Lab Report dated August 7, 2002, DNA Analyst Mary Krings concluded:
"No DNA foreign to Jerri Williams was detected on the left hand fingernails (Ex. 6.10)."

Interpretation/Comments on the left hand fingernails regarding OSP results and conclusion:

a. The bench notes indicated that "1 nail w/ red stain extracted directly with swab." Blood is considered to be a fairly rich source for DNA and a positive presumptive test for blood was obtained from one of the nails that exhibited some red staining. If any trace amounts of male DNA were present, they could easily have been masked by the significant amount of female DNA present.
b. Re-testing and avoiding this red stained area may allow for detection of a minor Y DNA profile. STR Analysis, Y-STR Analysis, and/or Mini-STR Analysis could be used.
c. The evidence from the Left Hand Fingernails (Lab Ex. 6.10) that should be remaining and available for re-testing is as follows:
    i. Any remaining DNA extracts (the bench notes indicate that extract was retained; however the notes do not indicate how much is left).
    ii. The actual fingernail clippings. Even though the fingernail clippings have been swabbed previously, they may still offer enough evidence to obtain a DNA profile for a potential minor male component.

3.5 Pillowcase (Lab Ex. 7.2, 7.3, and 7.4)

A pillowcase was collected from the scene. Bench notes regarding the forensic biology screening indicated the presence of brown staining on both sides of the exterior of the pillowcase with it being "soaked in & and diffuse not concentrated" and "stains on interior appear to be those of exterior going through fabric." This fact was not stated in OSP's report. The brown staining reportedly gave positive presumptive tests for blood.

In the subsequent DNA analysis, three separate cuttings (reported to be approximately 0.5 cm x 0.5 cm each) were taken from the soiled pillowcase.

In the OSP Lab Report dated August 7, 2002, DNA Analyst Mary Krings concluded:
"DNA from more than one person was detected on the pillowcase (Exhibits 7.2-7.4). Jerri Williams and Lisa Roberts cannot be excluded as major contributors of DNA to this exhibit.... Ed Mills, Daniel Miller, Curtis Fields, and George Deigner, as well as Sydney Houston...are all excluded as major contributors to the mixture. The minor profile(s) is below the threshold for entry into the database or for making a conclusive determination."

Interpretation/Comments on the pillowcase regarding OSP results and conclusion:

a. The conclusion provided by OSP Lab was a combination of the results from all three cuttings. The OSP report only stated that "DNA from more than one person was detected." However, based on the data and if trace alleles are considered, then DNA from at least three individuals was detected on two of the cuttings (Lab Ex. 7.2 and 7.3) and DNA from at least four individuals was detected on one of the cuttings (Lab Ex. 7.4).
b. Further, all three cuttings from the pillowcase indicated the presence of at least one male contributor. This fact was not stated in OSP's report.
c. All three cuttings from the pillowcase exhibited signs of degradation and there is a high likelihood that allelic dropout has occurred.
d. Re-testing of the pillowcase could provide a profile for the minor male profile. STR Analysis, Y-STR Analysis and/or Mini-STR Analysis could be used.
e. The evidence from the Pillowcase (Ex. 7) that should be remaining and available for re-testing is as follows:
    i. Any remaining DNA extracts (the bench notes indicate that extract was retained; however the notes do not indicate how much is left).
    ii. The pillowcase.
f. A property view of the pillowcase may prove to be valuable in understanding the staining patterns on the pillowcase, where the previous DNA cuttings were taken from, and in discerning which areas should be tested further.

4. SUMMARY CHART OF EVIDENCE THAT SHOULD BE REMAINING AND AVAILABLE FOR RE-TESTING

Lab Ex. #	Description	Type of Testing Possible
6.4 – swab sticks	Vaginal swab – remaining swab material and/or swab sticks	STR, Y-STR, and/or Mini-STR
6.4 –	Vaginal swabs – remaining DNA	Y-STR

Extract	extract from sperm fraction	
6.4 – sperm slides	Vaginal swabs – sperm slides created during DNA extraction process (3 slides with combined total of ~ 25 sperm heads)	STR, Y-STR, and/or Mini-STR
6.1A & 6.1B	Vaginal smears taken at autopsy (2 smears with combined total of ~ 12 sperm heads)	STR, Y-STR, and/or Mini-STR
6.8	Two Breast swabs	STR, Y-STR, and/or Mini-STR
6.8 - Extracts	Breast swab extracts – remaining DNA extract	Y-STR and/or Mini-STR
6.9	Right Hand Fingernail Scrapings – actual clippings	STR, Y-STR, and/or Mini-STR
6.9 - Extract	Right Hand Fingernail Scrapings – remaining DNA extracts	Y-STR and/or Mini-STR
6.10	Left Hand Fingernail Scrapings – actual clippings	STR, Y-STR, and/or Mini-STR
6.10 - Extract	Left Hand Fingernail Scrapings – remaining DNA extracts	Y STR
7	Pillowcase	STR, Y-STR, and/or Mini-STR
7.2-7.4 Extracts	Pillowcase	Y-STR and/or Mini-STR

5. RECOMMENDATIONS

Due to the limited amount of evidence remaining in this case and the low levels of male DNA that are indicated, re-testing should be done in a step-wise process with careful consideration given as to what information is currently available and what the potentials are for each item of evidence based on the previous testing and on DNA typing systems available today – STR Analysis using Identifiler, Y-STR Analysis, and/or Mini-STR Analysis.

Whenever testing evidence, it is usually best to go to the actual item of evidence. Re-testing is no different. There appear to be two remaining breast swabs that have never been tested. These two swabs would ideally be a good place to begin the re-testing process. In addition, attempting to collect sperm from the remaining swab material and swab sticks would be a good place to begin for the vaginal swabs. An assessment after the extraction and quantification of each of these would determine which process would be best for each of the samples.

The following chart summarizes laboratories with the capability to handle the challenging DNA samples in this case. It should be noted that while the Oregon State Police Forensic Lab is able to perform traditional STR Analysis, it does not have the ability to perform Y-STR Analysis or Mini-STR Analysis. This case may require the processing of non-routine evidence (i.e. the slides and/or smears) and the Oregon State Police Forensic Lab has not always been able or willing to process these types of samples. With the updates in procedures and types of analysis available, increased

sensitivities, less sample input required, the evidence is this case could provide results that include a full male DNA profile that can be entered and searched against profiles in the CODIS database. I would recommend the testing be performed at a location with the ability to process non-routine samples as well as being capable of processing the evidence using traditional STR Analysis, Y-STR Analysis and/or Mini-STR Analysis to get the best information out of each piece of evidence.

CHART OF RECOMMENDED LABORATORIES AND SERVICES

Laboratory Name	STR-Analysis	Y-STR Analysis	Mini –STR Analysis	Ability to process non-routine evidence such as removal of DNA from slides
OSP Forensic Lab[i] – Clackamas, OR	X			
Forensic Analytical[ii] – Hayward, CA	X (PP/CO only)	X		X
Orchid-Cellmark[iii] – Dallas, TX	X	X	X	X
DNA Diagnostics Center[iv] – Fairfield, OH	X	X	X	X

[i] Authorized CODIS laboratory
[ii] Ability to enter qualified samples into CODIS through arrangement with an unspecified CODIS authorized State Lab
[iii] No ability to enter qualified samples into CODIS without approval of Technical Leader in Oregon, requires a special site visit to obtain approval
[iv] Ability to enter qualified samples into CODIS through arrangement with a CODIS authorized State Lab